



Remote Operated Vehicle Dry Ice Pellet Decontamination System



Developer: Oceaneering Technologies, Inc.
Contract Number: DE-AC21-93MC30165
Crosscutting Area: Robotics

**Deactivation &
Decommissioning**
FOCUS AREA

Problem:

Concrete surface contamination inside buildings is one of the most serious problems at Department of Energy (DOE) facilities. Contamination typically consists of various radionuclides, heavy metals, and organic deposits resulting from leaks and spills. New technologies are required to remove concrete surface contamination in order that buildings can be reused, or, if they are to be dismantled, to permit disposal of the majority of the concrete as non-hazardous, non-radioactive waste.

Solution:

The Remote Operated Vehicle (ROV) Dry Ice (CO_2) Pellet Blasting System (ROV CO_2) has the potential to significantly reduce worker exposure, waste volume, and costs. This concrete decontamination system integrates the demonstrated technologies of remote operation of vehicles and dry ice blasting.

Benefits:

- Minimization of non-hazardous material removed and resulting decrease in volume containing hazardous material



►Elimination of process waste resulting from the blasting media

►Reduction of personnel-protection requirements

►Reduction of shift manpower requirements

►Reduction in capital-equipment costs and disposal costs

Technology:

The ROVCO₂ is an integration of a Remotec remote operated vehicle, a Cryogenesis CO₂ blasting unit, a Vacpac HEPA filter system, and Oceaneering's control system and COYOTEE manipulator. The manipulator was developed for sweeping the blasting workhead over flat floor surfaces. The control system uses the vehicle's camera and telemetry system and Oceaneering's operator interface to provide functional automation of decontamination.

The ROV is linked by a tether and a tether management system to the system containment van. The other end of the tether is connected to a Cryogenesis CO₂ pellet and nitrogen gas supply, a HEPA filtration system, a power supply, and the control unit. The entire system is packaged to be suitable for radioactive material transport and storage.

Project Conclusion:

The final System Productivity Tests for ROVCO₂ system were conducted at Florida International University (FIU) in March 1998. During the tests, approximately 15 ft² of

concrete floor was CO₂-blasted to determine the blasting rate for epoxy and paint and to obtain system reliability data.

The productivity of the ROVCO₂ depended significantly on the required level of decontamination and the type of coating covering the contamination. The system was able to achieve productivity rates of 94 ft²/hr (for 98 percent removal) on the top coat of paint placed on the epoxy, but a rate of only 2 ft²/hr (for 85-100 percent removal) on the underlying epoxy. These tests show that CO₂ blasting is not efficient at removing tough coatings; however, the system was effective at removing sealant type coatings and smearable contamination. This may be more cost effective, depending on the level of decontamination required.

Contacts:

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DOE's Federal Energy Technology Center supports the Environmental Management - Office of Science and Technology by contracting the



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